JAPANESE [JP,2001-248645,A]

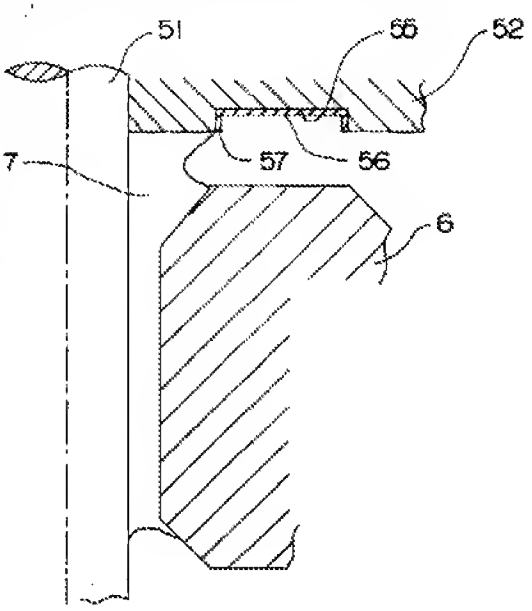
CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the bearing device which makes a lubricating oil intervene between an axis and a bearing, and supports an axis and a bearing movably relatively enabling free rotation.
[0002]
[Description of the Prior Art]In the bearing device which makes a lubricating oil intervene between an axis and a bearing, and supports an axis and a bearing movably relatively enabling free rotation, processing which prevents the above-mentioned lubricating oil from dispersing with a centrifugal force is performed. For example, in the drive of the various disks as an information recording medium, etc., when a lubricating oil disperses, a lubricating oil will adhere to a disc face and it will interfere with the record reproduction of information. The method of applying an oil repellent agent to the peripheral face of an axis, and the bearing of a rotor hub and the field which counters as a scatter prevention method of the conventional above-mentioned lubricating oil, for example, The slot which has edge is formed in the peripheral face of an axis, and the bearing of a rotor hub and the field which counters, and the method of preventing a lubricating oil from draining a lubricating oil by this edge and dispersing is known.
[0003]Drawing 8 shows the bearing part which gave the conventional lubricous oil scattering preventive

Drawing selection Representative draw



[Translation done.]

measures, and the example of composition of that neighborhood, a minute crevice is between the peripheral face of the axis of rotation 51, and the inner skin of the oil impregnated sintered bearing 6 which supports the axis of rotation 51 pivotable, and it is placed between these crevices by the lubricating oil 7. That by which the lubricating oil 7 was impregnated with the oil impregnated sintered bearing 6 oozes out. The proper solid of revolution 52, for example, a rotor hub, has fitted into the upper part of the axis of rotation 51 at one. It is the undersurface of the solid of revolution 52, and the oil repellent agent application part 8 is among the upper bed side of the bearing 6, and the positions which counter. The oil repellent agent application part 8 is formed over the perimeter centering on the axis of rotation 51.

[0004]

[Problem(s) to be Solved by the Invention]However, there are the following problems in the conventional lubricous oil scattering prevention method. In applying an oil repellent agent to the peripheral face of an axis, the above-mentioned oil repellent agent enters into the sliding part currently formed between the peripheral face of an axis, and the inner skin of a bearing, and there is a problem that lubricous abnormalities will occur. Since surface diffusion nature of an oil repellent agent is high when applying an oil repellent agent to a rotor hub side as shown in drawing 8, When it is easy to diffuse an oil repellent agent even on an axis when the place where the oil repellent agent was applied is close to an axis, and an oil repellent agent is spread, an oil repellent agent enters into the above-mentioned sliding part, and there is a problem that lubricous abnormalities will occur.

[0005]Although edge is provided in the peripheral face of an axis, and the bearing of a rotor hub and the field which counters and scattering of a lubricating oil may be prevented, it is difficult for what is called a barricade, a chip, etc. to occur, when forming a slot by race processing etc., and to form edge with high precision. Since a lubricating oil will flow out of the portion if the above-mentioned barricade, a chip, etc. occur, it is difficult to prevent a lubricating oil from dispersing only with edge.

[0006]The purpose of this invention is as follows.

Prevent a lubricating oil from dispersing certainly and easily by having been made in order to cancel the problem of the above conventional technologies, forming a slot in the bearing of a solid of revolution, the field which counters, or the peripheral face of an axis, and applying an oil repellent agent to this slot. Provide the bearing device which can prevent the applied oil repellent agent from permeating even a bearing portion.

[0007]

[Means for Solving the Problem]In a bearing device which makes [the invention according to claim 1 makes a lubricating oil intervene between an axis and a bearing, and] rotate an axis and a bearing relatively and makes, It adhered so that the above-mentioned axis might be countered with an axial edge face of the above-mentioned bearing in a this axis and really rotated solid of revolution, and a slot for oil repellent agent spreading was formed in an axial edge face of the above-mentioned bearing of a solid of revolution, and a field of a side which counters over the perimeter focusing on the above-mentioned axis, and an oil repellent agent was applied to this slot for oil repellent agent spreading.

[0008]As for the invention according to claim 2, edge is formed in an end by the side of the above-mentioned axis of a slot for oil repellent agent spreading in the invention according to claim 1.

[0009]The invention according to claim 3 is set up in the invention according to claim 2 based on a

centrifugal force which requires for a lubricating oil at the time of rotation of the above-mentioned solid of revolution a position in which the above-mentioned edge is formed.
[0010]In a bearing device which makes [the invention according to claim 4 makes a lubricating oil intervene between an axis and a bearing, and] rotate an axis and a bearing relatively and makes, A field of a side which adheres so that the above-mentioned axis may be countered with an axial edge face of the above-mentioned bearing in a this axis and really rotated solid of revolution, and counters with an axial edge face of the above-mentioned bearing of a solid of revolution, Covering a peripheral face of the above-mentioned axis located between axial edge faces of a bearing, a slot for oil repellent agent spreading was formed in the perimeter, and an oil repellent agent was applied to this slot for oil repellent agent spreading.
[0011]As for the invention according to claim 5, edge is formed in an end by the side of the above-mentioned bearing of the above-mentioned slot for oil repellent agent spreading in the invention according to claim 4.
[0012]The invention according to claim 6 is a hydrodynamic bearing in which the above-mentioned bearing makes oil retaining bearing or the above-mentioned lubricating oil generate a dynamic pressure action in the invention according to claim 1 or 4, and the above-mentioned solid of revolution is characterized by being a hub member for attaching a disk.
[0013]In a bearing device which makes [the invention according to claim 7 makes a lubricating oil intervene between an axis and a bearing, and] rotate an axis and a bearing relatively and makes, In a position which adheres so that the above-mentioned axis may be countered with an axial edge face of a bearing in a this axis and really rotated solid of revolution, are an axial edge face of a bearing of a solid of revolution, and a field of a side which counters, and prevents movement of a lubricating oil. Formed a slot for oil repellent agent spreading over the perimeter focusing on the above-mentioned axis, and edge was formed in an end by the side of the above-mentioned axis of a slot for oil repellent agent spreading, and an oil repellent agent was applied to a slot for oil repellent agent spreading.
[0014]
[Embodiment of the Invention]Hereafter, the embodiment of the bearing device concerning this invention is described, referring to drawings. The example of the motor which can apply this invention is shown in drawing 2. In drawing 2, the numerals 4 show a stator and 5 shows a rotor. The cylindrical bearing electrode holder 42 in which the lower part was inserted in the mounting hole of the motor substrate 41 and this motor substrate 41, and the stator 4 was fixed, It is inserted in the periphery of this bearing holder 42, and has the stator core 43 fixed to the basis of an intervention of a spacer by the motor substrate 41 with the screw, and the drive coil 44 wound about around the salient pole of the proper number radiately formed in this stator core 43. The rotor hub 52 as a solid of revolution which the above-mentioned rotor 5 fitted into the upper part of the axis of rotation 51 and this axis of rotation 51, and adhered, It has the cup shape flat rotor case 53 which adhered to this rotor hub 52 at one, and the rotor magnet 54 of the ring shape which adhered to the peripheral wall inner skin of this rotor case 53.
[0015]The cylindrical bearing 6 is inserted in the inner circumference side of the above-mentioned bearing holder 42. In this example, the bearing 6 is an oil impregnated sintered bearing, and the lubricating oil is impregnated with countless PORASU. The above-mentioned axis of rotation 51 is inserted in the inner circumference side of the bearing 6. A minute crevice is between the inner skin of the bearing 6, and the peripheral face of the axis of rotation 51, and the axis of rotation 51 rotates smoothly, without filling this

crevice with the above-mentioned lubricating oil, and the bearing 6 and the axis of rotation 51 carrying out metallic contact to it. Thrust loading is supported by the thrust pad means by which the axis of rotation 51 is proper. The motor shown in drawing 2 is a motor for disk drives, and the rotor hub 52 as a solid of revolution lays a disk, or constitutes the hub member for attaching and rotating. [0016]The bearing part of the above-mentioned motor and the details of the neighborhood are shown in drawing 1. It is placed between the minute crevices between the inner skin of the bearing 6, and the peripheral face of the axis of rotation 51 by the lubricating oil 7 in drawing 1. The lubricating oil 7 is held with surface tension in the above-mentioned infinitesimal gap, and the outflow is prevented. it is arranged, and it comes out and the axis of rotation 51 and really rotated rotor hub 52 as the above-mentioned solid of revolution is so that it may counter with the axial edge face (the example of drawing 1 upper bed side) of the bearing 6. The slot 55 for oil repellent agent spreading is formed in the undersurface side of the rotor hub 52 in the axial edge face of the above-mentioned bearing 6 of the above-mentioned rotor hub 52 and the field of the side which counters, i.e., the example of drawing 1, over the perimeter centering on the axis of rotation 51. The end of the slot 55 for oil repellent agent spreading, especially the end by the side of the axis of rotation 51 are formed in the square form. In this specification, the thing of the angle of this square form is called edge, and the numerals 57 are given to this edge by drawing 1.

[0017]The oil repellent agent 56 is applied to the above-mentioned slot 55 for oil repellent agent spreading. Drawing 5 shows the situation of spreading of the oil repellent agent 56. An oil repellent agent is made dropped from the oil repellent agent application nozzle 9 in drawing 5, carrying out flip vertical of the rotor hub 52 of the simple substance before uniting with the axis of rotation, turning the slot 55 for oil repellent agent spreading upward, and rotating an axis line for the rotor hub 52 as a center. Since surface extendibility of an oil repellent agent is high, it is extended to the surface of the slot 55 for oil repellent agent spreading. Since the end of the slot 55 for oil repellent agent spreading, especially the end by the side of the axis of rotation serve as the edge 57, as shown in drawing 1, extension of an oil repellent agent is prevented with the edge 57.

[0018]Since it returns to drawing 1 and the end by the side of the axis of rotation 51 of the slot 55 for oil repellent agent spreading serves as the edge 57, said lubricating oil 7 oozed and made into the minute crevice between the inner skin of the bearing 6 and the peripheral face of the axis of rotation 51 is also prevented in the position of the above-mentioned edge 57, and marching out outside more is prevented. The position in which the above-mentioned edge 57 is formed is set up based on the size of the centrifugal force concerning the above-mentioned lubricating oil 7 at the time of rotation of the rotor hub 52 as a solid of revolution. For example, the revolving speed of a solid of revolution is high, and when the centrifugal force concerning the lubricating oil 7 is large, it is good to come together axis-of-rotation 51, namely, to set the edge 57 as a position with a smaller inside diameter, and to prevent scattering of the lubricating oil by a centrifugal force a little early.

[0019]Drawing 4 shows the assembly procedure of the rotor group concerning the embodiment of this invention explained above as compared with the assembly procedure of the conventional rotor group. When (a) is based on the embodiment of this invention, it is a case where it is based on a conventional example (b) explained drawing 8 to be. When based on the embodiment of this invention shown in (a),

after applying an oil repellent agent to the above-mentioned slot 55 for oil repellent agent spreading of the rotor hub 52 and carrying out oil-repellent processing, the axis of rotation 51 is assembled to this rotor hub 52 by press fit or other means, and it unites with it. When based on the conventional example shown in (b), first, the axis of rotation 51 is assembled to the rotor hub 52 by press fit or other means, it unites with it, and oil-repellent processing is carried out after that.

[0020]In order to carry out oil-repellent processing after assembling a rotor group conventionally so that drawing 4 (a) and (b) may be understood that it compares, an oil repellent agent application process must be carefully advanced so that an oil repellent agent may not adhere to the axis of rotation 51 etc. And since surface extendibility of an oil repellent agent is high, it is difficult for it to apply to the position as which the flat field was determined correctly. In order to apply to the defined position correctly, how to use a mask etc. can be considered, but there is a difficulty that a process becomes complicated.

[0021]In that respect, when based on the embodiment of this invention, the oil repellent agent application range is divided in the slot 55 for oil repellent agent spreading, Since an oil repellent agent is only automatically diffused in the above-mentioned slot 55 after that and diffusion of an oil repellent agent is restricted with the edge 57 of the above-mentioned slot 55 that what is necessary is just to apply an oil repellent agent in this slot 55, an oil repellent agent application process becomes very easy. Since what is necessary is just to assemble the rear rotor group which performed oil-repellent processing, an oil repellent agent does not adhere to the axis of rotation in an oil repellent agent application process.

[0022]But whether before assembling a rotor group like drawing 4 (a), oil-repellent processing is carried out, or after assembling a rotor group like drawing 4 (b), oil-repellent processing is carried out do not interfere, even if this invention is not essential and it chooses any. The expected effect of this invention can be acquired very much for the process shown in drawing 4 (b).

[0023]The formation position of the slot for oil repellent agent spreading is not restricted to the end face of the bearing 6 of the rotor hub 52, and the field of the side which counters like the embodiment described so far. Like the embodiment described to drawing 6 and drawing 7, the slot for oil repellent agent spreading may be formed within the limits of the specification of the axis of rotation. in drawing 6 and drawing 7 -- the numerals 5 -- a rotor -- 51 -- the axis of rotation -- 52 -- the rotor hub as a solid of revolution -- 6 shows a bearing, 53 shows a rotor case, and 54 shows a rotor magnet, respectively. The slot 72 for oil repellent agent spreading is formed in the periphery of the axis of rotation 51 over the perimeter of the axis of rotation 51.

[0024]The position of the shaft orientations of the slot 72 for oil repellent agent spreading is set up between the undersurface (the example of a graphic display upper bed side) of the rotor hub 52, i.e., the axial edge face of the bearing 6, the field of the side which counters, and the above-mentioned axial edge face (upper bed side) of the bearing 6. The boundary of the upper part wall surface 51a of the above-mentioned slot 72 and the peripheral face of the axis 51 which were formed in the axis 51 serves as the edge 71, and the boundary of the bottom wall surface 51b of the above-mentioned slot 72 and the peripheral face of the axis 51 which were formed in the axis 51 serves as the edge 73.

[0025]After unifying this axis of rotation 51 and rotor hub 52 by press fit etc., the oil repellent agent is applied to the above-mentioned slot 72 for oil repellent agent spreading of the axis of rotation 51. The both ends of the slot 72 for oil repellent agent spreading, especially the end of the side near the upper bed side of

the bearing 6 serve as the edge 73, Preventing [and] that an oil repellent agent advances between the peripheral face of the axis of rotation 51, and the inner skin of the bearing 6, the above-mentioned edge 73 prevents that the lubricating oil between the peripheral face of the axis of rotation 51 and the inner skin of the bearing 6 flows into the method of outside.

[0026]In the thing of structure like the embodiment shown in drawing 5 and drawing 6, since the slot 70 surrounding the axis 51 is formed of the peripheral face of the axis 51, and the crevice formed in the undersurface feed-hole slippage to the rotor hub 52 as a solid of revolution, it is good also considering this slot 70 as a slot for oil repellent agent spreading. It is a form where the position of the edge 57 by the side of inner circumference of the slot 55 for oil repellent agent spreading formed in the rotor hub 52 was brought close to the axis 51 to the limit in short in the embodiment shown in drawing 1 and drawing 2. In this case, the penetration to the bearing surface of an oil repellent agent and the spill of a lubricating oil will be prevented with the above-mentioned edge 71 and 73 by forming the above-mentioned circumferential groove 72 in the axis 51 as mentioned above, and forming the edge 71 and 73 in the upper limb and margo inferior of this circumferential groove 72, respectively.

[0027]The following modification other than the embodiment described above is possible for this invention. Although each embodiment of a graphic display is a thing of the type which an axis rotates, in short, an axis and a bearing may carry out relative rotating of it to the basis of an intervention of lubricant, and it is just an axial fixed type thing.

[0028]As the edge by the side of an axis of the slot for oil repellent agent spreading does not necessarily need to be a thing of the sharply square form, for example, it is shown in drawing 3, The wall surface by the side of the inner circumference of the slot 55 for oil repellent agent spreading inclines, and may be formed, this wall surface and the undersurface of the solid of revolution 52 may make an obtuse angle mutually, and may cross, and the intersection of this obtuse angle may serve as the edge 57. It may be a thing of a form which was cuted off the corners at the proper angle, for example, a 45-degree slant face. For example, in the example shown in drawing 7, the portion of the edge 71 may be cuted off the corners, as the dotted line 51A shows. However, it forms so that the angle which clarified may appear.

[0029]This invention can acquire an expected effect by applying to this bearing while it is applicable to the bearing which makes a lubricating oil and other fluids placed between bearing parts, for example, the fluid dynamic pressure bearing etc. which make a lubricating oil generate kinetic pressure. A solid of revolution is a hub member for attaching a disk, and, in the case of the bearing device of disk driving, contamination of the disk to a lubricating oil can be more effectively prevented by formation of the slot for oil repellent agent spreading.

[0030]

[Effect of the Invention]In applying the oil repellent agent for preventing movement of the lubricating oil which intervenes between an axis and a bearing according to the invention given in claims 1, 4, and 7, Since the slot for oil repellent agent spreading was formed in the position which prevents a solid of revolution or the above-mentioned lubricating oil of an axis and the oil repellent agent was applied to it in this slot, while being able to prevent scattering of a lubricating oil by the above-mentioned oil repellent agent, Since an oil repellent agent can be limited to the above-mentioned slot, an oil repellent agent can be prevented from invading between an axis and a bearing, and generating of lubricous abnormalities can be

prevented.
[0031]Since an oil repellent agent coating position becomes settled clearly by forming the slot for oil repellent agent spreading, while being able to prevent an oil repellent agent from adhering to the part that it must not adhere, Since an oil repellent agent can be applied to the fixed range only by an oil repellent agent being dropped at the above-mentioned slot, an oil repellent agent can be easily applied to the fixed range.
[0032]According to claim 2 and the invention according to claim 5, since edge is formed in the end by the side of the bearing of the slot for oil repellent agent spreading, the inflow to the bearing part of the oil repellent agent applied to the above-mentioned slot and the outflow of the lubricating oil from a bearing part can be more effectively prevented with the above-mentioned edge. The outflow of a lubricating oil can be prevented still more effectively according to the synergistic effect of oil repellent agent spreading and the above-mentioned edge formation.

[Translation done.]